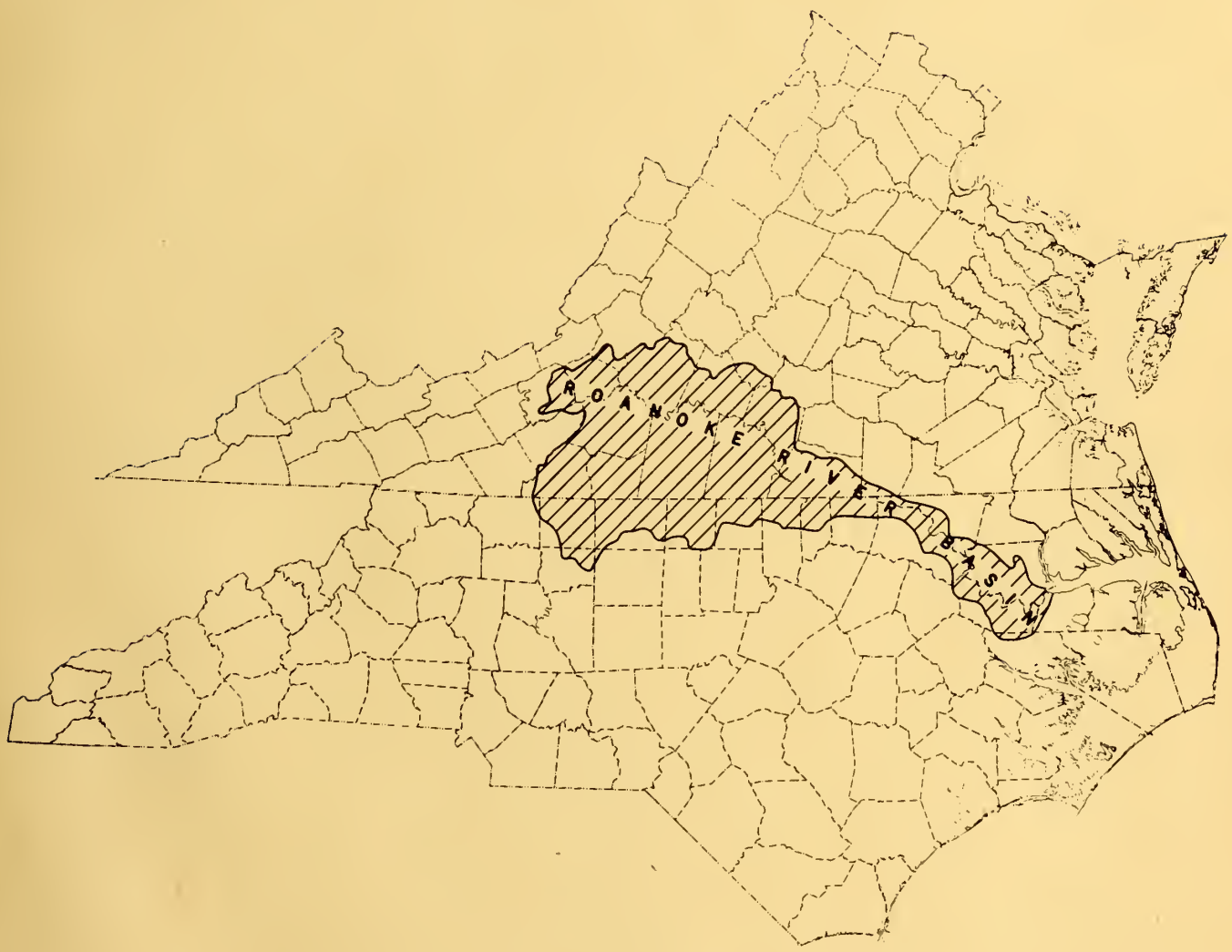
DEVELOPMENT
OF THE
ROANOKE RIVER



DIVISION OF PLANNING AND ECONOMIC DEVELOPMENT
VIRGINIA DEPARTMENT OF CONSERVATION AND DEVELOPMENT

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FOREWORD

In the fields of planning and development there is probably no subject more important than the use of the resources which Nature has provided. Some resources have to be mined or used so as to deplete permanently the available supply. Fortunately there are many which may be harvested and replaced periodically either by Nature or through the efforts of man. Water is a vital resource which may be harvested so as to increase its benefits to man even though in so doing it is, at times, necessary to flood land normally used for other purposes.

The preparation of a plan for the best use of the water draining from a large area and the development of that area in accordance with the plan require long periods of time. In order to insure the best results it is necessary that all factors be considered both in the planning and development phases. An understanding by the public is necessary to sound decisions.

The desire to make information readily available to those who are interested in the subject prompted the preparation of this pamphlet on the development of the Roanoke River Basin.

Raymond V. Long, Commissioner
Division of
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LIST OF TABLES, ILLUSTRATIONS, AND PLATES

INTRODUCTION

This is the second in a series of pamphlets which are being prepared to give to Virginians, and others who may be interested, information concerning some of the surface water resources of our State and the improvements thereof which have been proposed, started, or completed. The first pamphlet published pertained to the proposed development of the James River.

The Roanoke River is one of the many interests which are common to the people of North Carolina and Virginia. Those individuals who live or own property on the watershed are vitally concerned with any proposals for the development of the river and its tributaries.

Much time has elapsed since the first study in which was considered collectively the development of the rivers of the Roanoke River Basin for navigation, flood control, power development, and irrigation. Much more time will elapse before all of the beneficial developments are completed.

A large percentage of the information appearing in this pamphlet corresponds to that in House Document No. 650, 78th Congress, 2nd Session. Later information is available, and part of it has been included, concerning the projects at Buggs Island, Philpott, Schoolfield, and Roanoke Rapids.

Many appendices and plates, which were prepared by the Corps of Engineers, United States Army, could not be included in House Document No. 650. They are available in the Division of Planning and Economic Development, 301 State Finance Building, for use in that office.

Grateful acknowledgement is made to the Corps of Engineers, whose reports were essential to the preparation of this pamphlet, and to the Virginia Electric and Power Company for information concerning its proposed plant at Roanoke Rapids, N. C.

ROANOKE RIVER

The latest report (referred to herein as the 1944 report) on the Roanoke River (known also as the Staunton River between Clarksville and Altavista) was prepared by the Corps of Engineers, United States Army, in compliance with a resolution adopted by the Committee on Flood Control, House of Representatives, on 28 August 1940 and a request made on 26 January 1942 by the Committee on Rivers and Harbors of the House of Representatives. Both of those committee actions called for a review of a prior report (referred to herein as the 1934 report) which had been made on the Roanoke River and in which it was concluded "that while affording a potential source of hydroelectric power, a comprehensive plan for the improvement of the Roanoke River and its tributaries for navigation, and the prosecution of such improvement in connection with the development of potential power, flood control, or irrigation, is not economically justifiable at the present time" (1934). That 1934 report (published in House Document No. 65, 74th Congress, 1st Session) was the first one covering collectively navigation, flood control, power development, and irrigation in the Roanoke River Basin and the only such report prior to the latest which is published in House Document No. 650, 78th Congress, 2nd Session (1944).

Other prior reports, made during the period 1871-1938 covered only navigation possibilities in the Basin. The existing navigation project for the Roanoke River provides for:

> "a channel 12 feet deep and 150 feet wide from the 12-foot contour in Albemarle Sound into Roanoke River and thence upstream to a point about 1 mile above the town of Plymouth, N. C., 10 miles; thence a channel 10 feet deep and 100 feet wide to Hamilton, 53 miles; thence a channel 8 feet deep and 80 feet wide to Palmyra Landing, 18 miles, with a cut-off channel of like dimensions about 2 miles above Hamilton; and thence a channel 5 feet deep and 50 feet wide to Weldon, N. C., 50 miles, by dredging, snagging, and regulation."

The 1944 report presents the results of surveys and studies made in compliance with the two Congressional committee actions both of which asked for a review of the 1934 report to determine whether any improvements were advisable at the time.

The Roanoke River Basin (see Plate 1) is located in the southern part of Virginia and in the northern part of North Carolina. It is bounded by the James and Chowan River watersheds on the north, the New River watershed on the west, and on the south by the watersheds of the Tar, Neuse, Cape Fear, and Pee Dee Rivers. The Roanoke River Basin is approximately 220 miles long, from 10 to 100 miles wide, and includes parts of 15 counties (6160 square miles) in Virginia and 17 counties (3420 square miles) in North Carolina.

The data appearing in Tables No. 1, No. 2, and No. 3, give some indication of the nature of the terrain through which the Roanoke, Dan, and Smith Rivers flow. A profile appears on Plate 2.

Table No. 1 -- Drainage characteristics of the Roanoke River

Reach	Elevation, feet above mean sea level	Distance, miles	Fall in feet		Average width of stream, feet	Drainage area, square miles
			Total	Per mile		
Source ----------	2,900					0
To--		54.7	2,080	[1]16.5	80	
Niagara, Va. -----	820					511
To--		80.4	334	4.2	100	
Taber, Va. -------	486					2,249
To--		19.5	130	6.7	200	
Brookneal, Va. ---	356					2,420
To--		102.2	190	1.9	400	
Eatons Ferry, N.C.[2]	160					8,278
To--		23.2	135	5.8	600	
Weldon, N.C.[3] ----	25					8,445
To--		92.5	26	.3	250	
Williamston, N.C.-	1					9,000
To--		37.5	1	0	550	
Mouth ----------	0					9,580

[1] Weighted mean value.
[2] Upper limit of fall zone.
[3] Lower limit of fall zone.

Table No. 2 -- Drainage characteristics of the Dan River

Reach	Elevation, feet above mean sea level	Distance, miles	Fall in feet		Average width of stream, feet	Drainage area, square miles
			Total	Per mile		
Source ----------	3,000					0
To--		87.0	2,430	[1]15.0	80	
Pine Hall, N C. ---	570					481
To--		28.7	78	2.7	120	
Leaksville, N.C. --	492					1,150
To--		30.9	108	3.5	310	
Danville, Va. -----	384					2,050
To--		62.7	123	2.0	240	
Mouth ----------	261					3,855

[1] Weighted mean value.

Table No. 3 -- Drainage characteristics of the Smith River

Reach	Elevation, feet above mean sea level	Distance, miles	Fall in feet		Average width of stream, feet	Drainage area, square miles
			Total	Per mile		
Source ----------	3,000					0
To--		30	2,090	[1]15.4	---	
Union Church ------	910					146
To--		17	170	10.0	80	
Bassett ----------	740					257
To--		12	80	6.7	100	
Martinsville ------	660					374
To--		24	170	7.1	100	
Mouth ----------	490					550

[1] Weighted mean value.

Approximately 16½ percent of the population of Virginia (estimated at 2,955,000 on 1 July 1947), or some 487,000 persons, and approximately 6½ percent (or about 238,000 persons) of the population of North Carolina live in the Roanoke River Basin.

The reservoirs which existed in the Basin at the time of the latest study are listed in Table No. 4.

Frequent floods in the Roanoke River Basin (which have occurred in every month of the year) cause considerable loss and inconvenience to agricultural interests, urban areas, and to transportation and communication facilities. Damages occur throughout the watershed but the major flood losses are confined mainly to the Roanoke, Dan, and Smith Rivers. 78 percent of the total flood plain area of the three main rivers, and 61 percent of the agricultural area on the flood plain, lies in the lower part of the basin in North Carolina where the plain is from 1 to 6 miles wide. In the Piedmont region the flood plains are narrow and, in general, contain relatively small agricultural acreage per mile of river. The resulting flood damage per mile of river is small.

The storm of 10-17 August 1940, which swept most of the South Atlantic States, produced the most widespread and intense rainfall of record in this watershed. Associated with a tropical hurricane, that storm was blocked in its northward passage near the Virginia-North Carolina boundary and was diverted along the axis of the Roanoke River Basin in an easterly direction. The heaviest precipitation, 17½ inches, occurred along the northeasterly edge and just outside of the basin with a rainfall averaging 12.8 inches over 8,000 square miles around a center at Keysville, Va. The average rainfall on the 8,410 square miles of watershed above Roanoke Rapids was 10.1 inches most of which occurred in two days. Copper Hill (S. W. of Roanoke), Randolph, and Clarksville stations recorded over 15 inches of

Table No. 4 -- Existing reservoirs in the Roanoke River Basin

Stream and Location of reservoir	Owner	Spillway crest elevation, feet above m.s.l.	Area of surface, acres	Drainage area, square miles	Storage capacity, acre-feet	Principal use of storage	Head, feet	Power installation, kilowatts
Roanoke River								
Roanoke, Va.	(1)	910	Small	388	Small	Condensing water	(5)	(5)
Roanoke, Va.	(2)	901	Small	389	Small	Process water	(5)	(5)
Roanoke, Va.	(2)	900	Small	389	Small	Process water	(5)	(5)
Roanoke, Va.	(1)	884	70	511	Small	Water power	60	2,900
Roanoke Rapids, N.C.	VEP Co.	82	45	8,395	Small	Water power	30	6,200
Dan River								
Patrick County, Va.	City of Danville, Va.	2,535	165	20	7,590	Water storage	(5)	(5)
Patrick County, Va.	City of Danville, Va.	2,221	40	33	1,150	Water power	700	10,000
Walnut Cove, N.C.	Duke Power Co.	(4)	10	397	Small	Water power	18	600
Schoolfield, Va.	(3)	435	600	1,878	1,500	Water power	27	5,500
Danville, Va.	(3)	407	300	2,049	Small	Water power	9)	3,500
Danville, Va.	(3)	395	Small	2,049	Small	Water power	9)	
Mayo River								
Mayodan, N.C.	Washington Mills	(4)	Small	(4)	Small	Water power	(4)	(4)
Mayodan, N.C.	Washington Mills	(4)	Small	(4)	Small	Water power	(4)	(4)
Smith River								
Fairystone State Park, Va.	State of Virginia	991	141	21	Small	Recreation	(5)	(5)
Martinsville, Va.	City of Martinsville, Va.	696	200	374	1,200	Water power	30	1,300
Spray, N.C.	Spray Water, Power & Land Co.	539	20	545	Small	Water power	38	1,100
Bannister River								
Halifax, Va.	Va. Public Service Co.	(4)	380	520	Small	Water power	24	1,300
Pigg River								
Rocky Mount, Va.	(1)	(4)	Small	(4)	Small	Water power	24	150

(1) Appalachian Electric Power Co.
(2) American Viscose Corporation.
(3) Riverside and Dan River Cotton Mills.
(4) Data not available.
(5) Not applicable.

rainfall. Prior to that storm only one station in Virginia was known to have experienced more than 10 inches in a similar period of general rainfall.

The August 1940 flood was from 2 to 6 feet higher than previous floods of record on the Roanoke River below Altavista, Va., and on the lower Dan River. Three lives were lost. Agricultural lands, industrial plants, and commercial establishments were flooded and traffic and communication facilities were interrupted. Twenty-four cities and towns sustained damages varying from a few hundred to almost a million dollars. The water supply systems of 10 cities and towns were affected and some were forced to suspend operations for as long as 7 days. At Weldon, N. C. it was necessary to use a United States Army portable filtration unit for 6 days until the flood had subsided and the water supply system was rehabilitated. Practically the entire crop on the flood plains in the upper Roanoke, Dan, and Smith River valleys was destroyed. Much more damage was done by that disastrous flood but the preceding brief outline will give a partial picture of the loss which amounted to over five and a quarter million dollars in the Roanoke River Basin.

For the purpose of designing reservoir spillways, computations are based on a "maximum probable flood". It is estimated as the flood which would result from a single storm, or a succession of storms, assuming the worst possible meteorological and ground conditions. In the 1944 report on the Roanoke River Basin the maximum probable flood was such that the natural flood stage would be 8.4 feet above the 1940 flood stage at Roanoke, 19.0 feet above at Altavista, 19.5 feet above at Brookneal, 12.3 feet above at Clarksville, 16.4 feet above at Roanoke Rapids gage, 22.0 feet above at Danville, 16.2 feet above at South Boston, 24.7 feet above at Bassett, and 27.5 feet above at Martinsville. Computations were made for many additional locations. The "maximum probable flood" for the Buggs Island and Philpott projects was reestimated during the design of these two projects in the light of more

up-to-date information. As a result the "maximum probable flood" was increased by 34 percent at Buggs Island and by 7 percent at Philpott.

In order to have something definite which is suitable for use as a basis in determining whether proposed installations should be constructed the Engineers compute an "economic ratio" for each project. This "economic ratio" expresses the relationship of the estimated annual cost (including but not limited to interest, amortization, and operation of the project) - taken as 1 - to the estimated annual benefits to be derived from the completed project. If the "economic ratio" is 1 to less than 1 the project cannot be justified on an economic basis. Only one of the projects in the preferred plan recommended by the District Engineer showed a favorable economic ratio on the basis of flood control alone. In the latest study the comprehensive plan for the fullest development of the water resources of the Roanoke River Basin, on an economically sound basis, contemplates the construction of multiple-purpose dams. At the time of that study the entire system of reservoirs showed an economic ratio of 1 to 1.47. The annual charges were computed to be $5,223,300. The estimated annual benefits of $7,692,400 were as follows:

For electrical power	7,281,400
For flood control	379,000
For existing hydroelectric plants	32,000

As part of his study and to learn the desires of the local public, the District Engineer held one hearing (at Martinsville, Va., on 28 October 1938) and received many letters from interested parties. Several plans for flood protection were suggested including the construction of dikes, reservoirs, and the enlargement and straightening of the river channels. It was clear the local interests desired the alleviation of the flood hazard by some form of properly planned and maintained flood-control works.

By analyzing flood loss data available for past floods and the frequency with which floods of various stages have occurred it was possible to determine the estimated average annual flood loss to be expected in the future. This was done for 10 zones, or sections, along the Roanoke River, 5 along the Dan River, and 3 along the Smith River. Based on prices and the development of the flood plain in 1942, the estimated average annual flood damages were $323,250 in the Roanoke River Valley ($243,400 below Buggs Island), $47,250 in the Dan River Valley, and $154,300 in the Smith River Valley ($102,000 from Philpott to Fieldale), or a total of $524,800.

Obviously dollar estimates of flood damages cannot include such things as the loss of life or the adverse effect on living conditions and health of the people affected by the floods.

In order to determine the most feasible solution for the alleviation of the flood losses at the principal damage centers, investigation was made of the following methods of securing flood control:

a. Lowering the flood stages by channel improvement.

b. Local flood protection by means of flood walls or levees.

c. Reservoirs operated entirely for flood control.

d. Multiple-purpose reservoir development, combining flood control with water-power production and other functions.

LOCAL WORKS

Channel improvement was considered at local damage centers in several instances but in no case was it found to be warranted.

Since the total damage in a major flood had not exceeded $5,000 at such localities as Salem, Randolph, Clarksville, and Jamesville (N. C.), flood protection

walls or levees at these places could not be justified. Investigation of the possible use of walls or levees, or a combination of both, at Roanoke, Altavista, Roanoke Rapids (N. C.), and Weldon (N. C.), showed that such local protection was not economically sound. The same conclusion was reached with respect to Danville and South Boston on the Dan River. Study of similar works in the Smith River Valley for protection against the October 1937 flood stage at Bassett, Stanleytown, Fieldale, Koehler, Martinsville, and Spray, N. C., gave a favorable economic ratio (1 to 1.00) in only one locality - Martinsville. Protection to a higher flood stage would be economically favorable at Stanleytown, Fieldale, and Martinsville. Consideration was also given to an improvement which would combine levees and channel work through Bassett where the major portion of the flood damages along the Smith River occurs. There the annual charges were found to be five times as large as the annual benefits with protection to the 1937 flood stage. Local field protection works were considered an unsuitable means for the control of floods in the Smith River Valley because protection of the major flood damage center was not justified and the economic development of the areas involved would be confined to those protected by these works. Investigation of three rural areas (in N. C.) which were the most favorable for local protection from the standpoint of both topography and concentration of agricultural lands per mile of river resulted in an unfavorable economic ratio. The possibility of using the methods indicated in this paragraph was discarded after studies showed none of them to be desirable.

RESERVOIRS FOR FLOOD CONTROL ONLY

Since local flood protection works were found to be not warranted, investigations were made to determine whether reservoirs, operated for flood control

only, would be justified. Reservoirs considered for this purpose included dams at the Buggs Island, Randolph, and Smith Mountain sites on the Roanoke River; the Schoolfield site on the Dan River; and the Philpott No. 4 site on the Smith River. These were the most outstanding available sites where the drainage from a large part of the area upstream from the principal damage centers would be controlled and sufficient storage capacity could be made available at reasonable cost. Consideration was also given to flood protection for Roanoke by means of a reservoir located upstream on the Roanoke River. Of the above, the only one having a favorable economic ratio for flood control alone was the reservoir at the Philpott No. 4 site which, for storage capacity to accommodate 6 inches of runoff, had a ratio of 1 to 1.14 and to accommodate 8 inches of runoff a ratio of 1 to 1.11.

MULTIPLE PURPOSE RESERVOIR DEVELOPMENT

Since but a small portion of the flood damages in the basin could be eliminated economically by the construction of reservoirs for flood control alone, investigations were made of multiple-purpose reservoirs. Such reservoirs not only would control floods but also would provide low-water regulation for hydroelectric power generation, pollution abatement, and water supply, and be a recreational asset.

The Roanoke River Basin is an attractive watershed for the economical development of a large potential water resource. Several excellent dam sites, the sparsely inhabited nature of the areas to be flooded by proposed reservoirs, and the absence, in most cases, of railroads along the rivers all point to its suitability for such an undertaking.

Large electric utility companies have shown definite interest in the development of the potential water-power resources of the basin and there will be

suitable markets for the electric power upon completion of the construction of the dams for which funds have been or will be authorized.

The plan in the 1934 report included a combination of 17 reservoirs which could have been developed for the maximum utilization of the potential water power of the basin. Information concerning those reservoirs appears in Table No. 5.

Table No. 5 -- Reservoirs of the 1934 plan

Project	River	Location of dam, miles above mouth of river	Reservoir elevation, feet above mean sea level [1]	Estimated cost in 1934
Smith Mountain ---	Roanoke	314.18	750	$ 3,018,000
Leesville --------	Roanoke	293.72	592	1,343,000
Taber ------------	Roanoke	275.5	508	831,000
Seneca -----------	Roanoke	268.20	483	910,400
Melrose ----------	Roanoke	263.21	455	1,026,000
McKeever ---------	Roanoke	261.71	423	838,000
Randolph ---------	Roanoke	227.75	400	4,793,000
Pinnacles --------	Dan	190.10	2,220	962,000
Joyce Mill -------	Dan	170.0	1,100	82,400
Gorge ------------	Dan	161.2	1,000	327,000
Clemmons Ford ----	Dan	152.9	860	522,000
Stuart -----------	Smith	5.25	645	1,131,000
Miry Creek -------	Dan	28.0	340	1,048,000
Russell Island ---	Roanoke and Dan	[2] 204.5	308	3,154,000
Buggs Island -----	Roanoke	178.67	267	6,820,000
Gaston -----------	Roanoke	144.90	192	7,780,000
Roanoke Rapids ---	Roanoke	137.52	127	4,880,000
Total ----------				$39,465,800

[1] Top of gates or spillway crest elevation where ungated.
[2] Above mouth of Roanoke River.

In the latest study (the 1944 report) investigations were made of the reservoirs in the 1934 plan and others to determine their economic feasibility at the time. Further consideration was given to combining flood-control with water-power development. Several reservoirs in the 1934 plan were combined, two were added, others were eliminated, and the reservoir-full elevations of all were revised.

The investigations indicated that greater economy would result if the dams at the Buggs Island and Smith Mountain sites were raised above the elevations selected in the 1934 plan. Studies also showed that a new canal from the Roanoke Rapids Dam to a point below Weldon would develop economically valuable additional head. The site of the Philpott reservoir on the Smith River was selected primarily for its flood control value. The Schoolfield site on the Dan River was chosen for its increased storage capacity in lieu of the smaller storage capacities at the Joyce Mill, Gorge, and Clemmons Ford sites on the upper Dan River. The Schoolfield site would also benefit from the regulation at the Stuart and Philpott projects. The Melrose project, with diversion to Whipping Creek, would eliminate the Seneca and McKeever plants, and this plan indicated possibilities of lowering the Randolph maximum pool elevation to eliminate excessive railroad relocation in the latter reservoir area.

A multiple-purpose reservoir for flood control, hydroelectric power, and low-water regulation was considered on the Roanoke River upstream from Roanoke, Va. Although such a project would be desirable, it was not justified economically because of the existence of two main-line railroads in the possible reservoir areas. The excessive cost of such a project would not be commensurate with the resulting benefits.

From the studies it was determined that two alternative systems of reservoirs were possible and that either system would be justified for the comprehensive development of the potential water power in the basin. The "preferred plan" would have 11 reservoirs and the "alternative plan" would have 13 reservoirs. The essential differences between the two plans are indicated by the reservoir-full elevations determined at the time and shown in Table No. 6.

Table No. 6 -- Alternative reservoir plans

Reservoir	River	Reservoir-full elevations	
		Preferred plan	Alternative plan
Roanoke Rapids	Roanoke	127	127
Gaston	Roanoke	200	200
Buggs Island	Roanoke	317	277
Clarksville	Roanoke	(1)	320
Randolph	Roanoke	380	420
Melrose	Roanoke	486	463
Seneca	Roanoke	(1)	486
Taber	Roanoke	525	525
Leesville	Roanoke	597	597
Smith Mountain	Roanoke	780	780
Schoolfield	Dan	500	500
Stuart	Smith	655	665
Philpott	Smith	995	995

[1] Dams at these sites not included in preferred plan.

The advantages of the "preferred plan" were sufficient to warrant its selection as the recommended scheme for the orderly comprehensive development of the water resources of the Roanoke River Basin. It would include 11 projects: two multiple-purpose reservoirs for flood-control, water power, and low-water regulation and 9 other reservoirs for storage and head for power production. Information concerning the nine storage and power production projects appears in Table No. 7. Data for the Buggs Island and Philpott projects are listed in Table No. 8.

At the time of the study it was determined that the ultimate development, as outlined in the 1944 report, would have an installed electrical-generating capacity of about 360,000 kilowatts. In the definite project plans for Buggs Island and Philpott Reservoirs, which were prepared before starting construction,

Table No. 7 -- Data pertaining to nine of the eleven projects of the preferred plan
(For data on the Buggs Island and Philpott projects see Table No. 8.)

Project	Gaston	Roanoke Rapids		Smith Mountain	Leesville	Taber
Recommended priority of construction	3	4		5	6	7
River	Roanoke	Roanoke		Roanoke	Roanoke	Roanoke
		Dam	Canal(1)			
Drainage area in square miles	8,339	8,395	---	1,020	1,497	2,249
Type of dam	(2)	Concrete	---	Concrete	(2)	Concrete
Type of spillway	Gated	Gated	---	Ungated	Gated	Gated
Maximum height of dam in feet	108	79	---	244	95	54
Reservoir elevations in feet above M.S.L.:						
Top of dam	212	147	---	814	610	534
Maximum (design flood)	205	142	---	808	599	535
Top of gates or spillway crest	200	127	---	780	597	525
Maximum power pool	200	127	125	780	597	525
Minimum power pool	198	125	125	734	596	522
Storage capacity in acre feet: (4)						
Surcharge storage (5)	88,000	71,000	---	565,000	5,700	26,000
Minimum flood storage reservation	0	0	0	0	0	0
Usable power storage	39,000	7,100	---	520,000	2,800	5,500
Total storage (6)	432,000	50,700	---	825,000	76,900	34,000
Installed power capacity in kilowatts	54,000	8,400	50,400	33,000	16,000	10,000

For notes see following page.

Table No. 7 (contd.)

Project	Melrose		Randolph	Stuart	Schoolfield
Recommended priority of construction	8		9	10	11
River	Roanoke		Roanoke	Smith	Dan
	Melrose	Whipping Creek			
Drainage area in square miles	2,370	19	2,982	534	1,890
Type of dam	(2)	(3)	(2)	(3)	(3)
Type of spillway	Gated	Ungated	Ungated	Ungated	Ungated
Maximum height of dam in feet	110	96	147	138	126
Reservoir elevations in feet above M.S.L.:					
Top of dam	510	498	415	678	527
Maximum (design flood)	496	494	406	672	521
Top of gates or spillway crest	486	486	380	655	500
Maximum power pool	486	486	380	655	500
Minimum power pool	485	478.5	367	632	487
Storage capacity in acre feet: (4)					
Surcharge storage (5)	38,400	---	514,000	98,000	282,000
Minimum flood storage reservation	0	---	0	0	0
Usable power storage	3,100	8,400	150,000	85,000	100,000
Total storage (6)	78,600	42,200	305,000	163,000	248,000
Installed power capacity in kilowatts	---	34,500	24,000	9,000	24,000

Notes: 1 - In order to develop the head below the dam, water would be diverted into a canal leading to a powerhouse below Weldon, N. C.
2 - Concrete and earth fill.
3 - Earth fill.
4 - One acre foot equals 43,560 cubic feet or 325,851 gallons.
5 - Includes surcharge storage utilized above spillway crest or top of gates during spillway design flood with reservoir full prior to such flood.
6 - To top of gates or to spillway crest of ungated dam.

the installed electrical-generating capacities exceed those assigned to the two projects in the 1944 report. In view of the increasing requirement for electrical capacity and energy it is probable that later power production installations will also exceed the installed capacity contemplated in the 1944 report.

After the construction of all of the reservoirs in the preferred plan, 84 percent of the average annual flood damage to property outside of the reservoir areas which, at the time of the study, existed on the flood plain along the Roanoke, Dan, and Smith Rivers would be eliminated. Flood protection would not be provided for areas along the Roanoke River at and upstream from Roanoke, Va., for areas along the Dan River, or for areas along other smaller tributaries as investigations indicated that the cost of such protection at those localities could not be justified economically.

The Buggs Island and Philpott Reservoirs, the first two projects to be constructed under the 1944 plan, would provide practically all of the flood-control features included in the preferred plan. Control of floods on the upper Roanoke (or Staunton) River would be provided by the Smith Mountain Reservoir although the average annual flood control benefits are small.

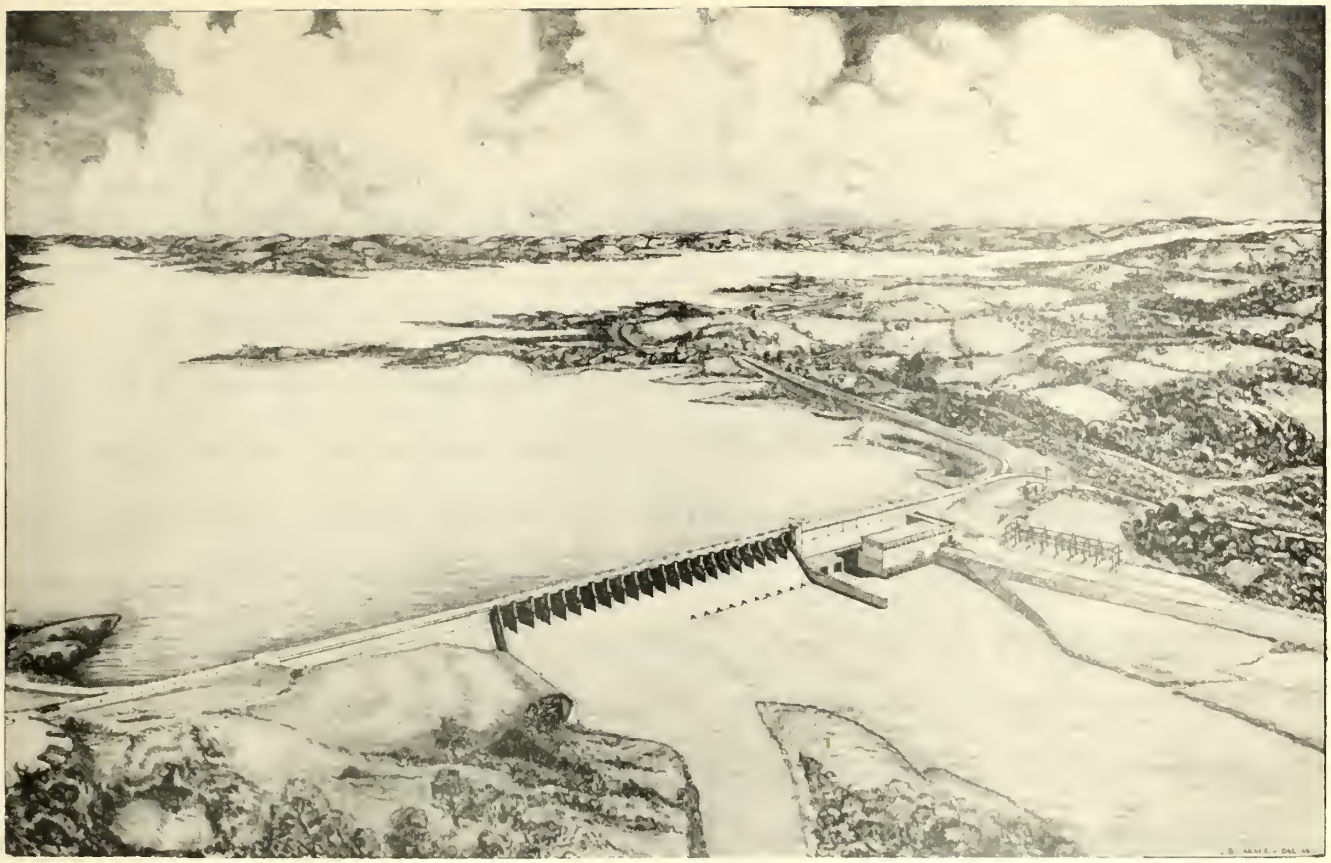
In submitting the report on the Roanoke River to The Chairman of the House Committee on Flood Control, on 22 May 1944, the Chief of Engineers recommended the adoption of the general plan of development outlined therein and authorization of the construction of the Buggs Island and Philpott projects as the initial step. The report is published in Document No. 650, 78th Congress, 2nd Session.

The Flood Control Act of 1944 provided, in part, "That the following works of improvement for the benefit of navigation and the control of destructive flood waters and other purposes are hereby adopted and authorized * * *

Roanoke River Basin

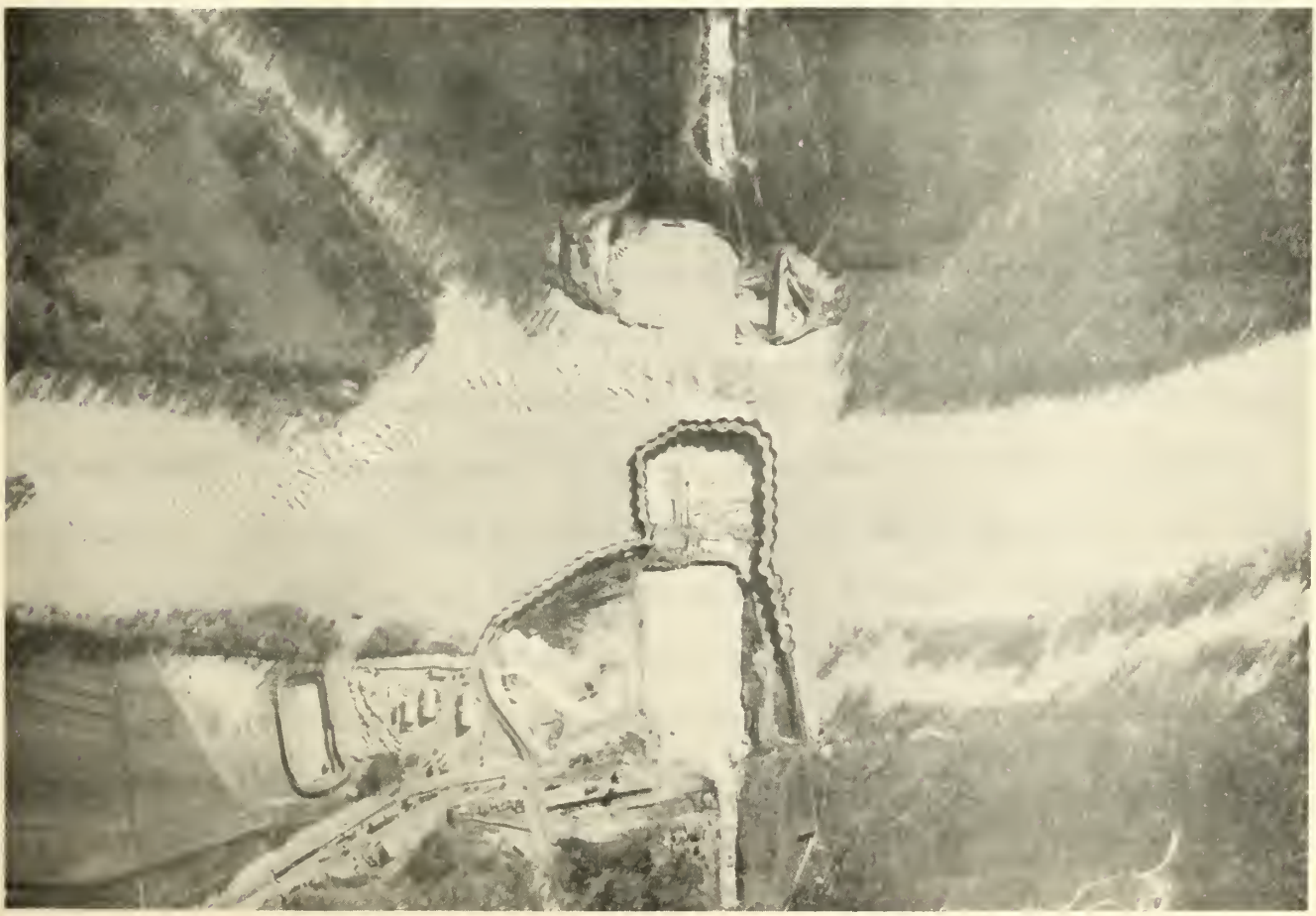
The general plan for the comprehensive development of the Roanoke River Basin for flood control and other purposes recommended by the Chief of Engineers in House Document Numbered 650, Seventy-eighth Congress, second session, is approved and the construction of the Buggs Island Reservoir on the Roanoke River in Virginia and North Carolina, and the Philpott Reservoir on the Smith River in Virginia, are hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in that report at an estimated cost of $36,140,000."

The first appropriation for the Buggs Island project was made for the fiscal year 1945 and for the Philpott project for the fiscal year 1946.



COURTESY OF CORPS OF ENGINEERS

ARTIST'S SKETCH OF BUGGS ISLAND PROJECT



COURTESY OF CORPS OF ENGINEERS

BUGGS ISLAND SITE - 1 DECEMBER 1948. FLOW - 65,000 CUBIC FEET PER SECOND

BUGGS ISLAND DAM AND RESERVOIR

The preparation of definite project plans on Buggs Island Reservoir was authorized by the Chief of Engineers on 25 April 1945. Engineering investigations of the Buggs Island site for the 1944 report included subsurface explorations, geological analyses, office analyses and designs, laboratory analyses, field reconnaissance and office investigation of relocations, gross appraisal of land values, a detailed topographic survey of the dam site, and a survey of the entire reservoir area made from aerial photographs by means of multiplex aero-projectors and showing topography, planimetry, and culture. Subsurface investigations included seismic exploration of wing dike areas, auger holes in borrow areas, and nine core holes drilled along the proposed axis of the dam. Two holes were drilled in each abutment, four were drilled in the flood plain, and one hole was drilled in a saddle in the left abutment ridge. Subsurface explorations immediately upstream made previously by a power company indicated that satisfactory rock was available in the stream channel.

In connection with the preparation of the definite project plans the prior engineering studies were supplemented by additional foundation investigations and laboratory investigations. Detailed surveys were extended and field investigations were made in connection with studies of relocation of railroads, highways, and utilities. The land within the reservoir area was again appraised. Many other studies, designs, analyses, and estimates were made. Necessary information, comments, and recommendations were obtained from the Federal Power Commission, the U. S. Public Health Service in collaboration with the state health departments, the National Park Service, the U. S. Fish and Wildlife Service, the U. S. Bureau of Mines, and the U. S. Geological Survey.

Approximately 500 persons attended a public hearing at South Hill, Va., on 5 December 1945, during which information on the Buggs Island project was presented. Some opposition to the project was introduced. Those present at the hearing adopted a resolution approving and indorsing the plan for the development of the Roanoke River Basin (House Document No. 650, 78th Congress) and advocating early appropriations for the construction of the Buggs Island and Philpott projects. The District Engineer received communications from parties who agreed with the proposed plan and others who disagreed in whole or in part. Others desired additional information.

The site selected for the Buggs Island Dam is located on the Roanoke River, in Mecklenburg County, about 20.3 miles downstream from Clarksville and 18 miles upstream from the Virginia-North Carolina state line. The total controlled storage volume to the top of the spillway gates (elevation 320 feet) will be 2,921,000 acre-feet. An acre-foot is the amount of water required to cover one acre to a depth of 1 foot or 43,560 cubic feet (325,851 gals.). The top of the dam will be at an elevation of 332 feet. The space between the maximum power pool level (elevation 300 feet) and elevation 320 feet, or 1,345,000 acre-feet (roughly the storage required to so control the 1940 flood run-off that the damage below Buggs Island is negligible), will be reserved for flood control storage which will accommodate 3.2 inches of run-off from the 7,800 square mile drainage area. The remaining storage (1,576,000 acre-feet) will be used for the production of hydroelectric power, low-water regulation, silt retention, and dead storage. The usable power storage will be from elevation 268 to elevation 300 and will amount to 1,085,000 acre-feet. This power pool level normally will be drawn down from elevation 300 in June to about 280 in the fall months. The 491,000 acre-feet of storage below elevation 268 will be dead storage. U. S. Department of Agriculture surveys indicate

that the average amount of silt to be deposited annually in the Buggs Island Reservoir will be equivalent to an erosion of about 1/100 of an inch over the entire drainage area (7800 sq. mi.) above the dam. This erosion rate, which will decrease with increased effectiveness of soil conservation measures, will result in about 50 acre feet of silt per 100 square miles of drainage area each year. This rate will reduce the total storage capacity below elevation 300 by about 12 percent in 50 years. If 1/3 of the silt remains above elevation 268, the usable power storage will be reduced by about 4 percent in 50 years. The initially installed power capacity will be 108,000 kilowatts which, at the load factor contemplated and based upon forecasts of future power needs, will be required before 1955. The ultimate installed capacity will be 204,000 KW exclusive of two 1,000 KW station service units. Additional statistical information concerning the dam and reservoir appears in Table No. 8. The site may be reached by turning off of Highway 58 about 5 miles east of Boydton at the Buggs Island sign. Parking and observational facilities are available to the public.

It is probable that none of the possible recreational uses (tourist, vacation, day-use, organized camping, or private cabins) of the Buggs Island project will be of national significance. Undoubtedly state and local interest will lead to the advantageous use of the area for recreation. The Flood Control Act of 1946 includes information pertaining to recreational facilities in reservoir areas under the control of the Department of the Army. Representatives of the National Park Service recommend, in part, that:

a. Buggs Island and other potential reservoirs in the Roanoke River Basin be considered jointly so that no developments be made at Buggs Island which would be better placed elsewhere.

b. Preparation of recreational master plan for the reservoir be in very simple form.

Table No. 8 -- Reservoir data

	Buggs Island Reservoir	Philpott Reservoir
Dam		
Type	Nonoverflow concrete gravity sections, concrete gravity spillway section, gate controlled; concrete gravity power intake section; wing and saddle dikes on right and left banks	Concrete gravity with 120 ft. long ungated spillway
Length in feet		920
Right earth wing and saddle dike	9,100	
Nonoverflow section on right bank	600	
Spillway	1,150	
Intake to powerhouse	647	
Nonoverflow section on left bank	400	
Left earth wing and saddle dikes	10,600	
Maximum height: concrete section	144	220
earth fill sections	45	
Maximum width at base		166
Spillway section only	106	
Including apron	140	
Number of crest gates (each 42' long by 32' high)	22	none
Number of sluices	6	3
Capacity in c.f.s. of sluices at elevation shown	19,000 (300)	13,500 (985)
Elevations in feet above mean sea level (M.S.L.)		
Top of dam	332	1,016
Flood plain (general elevation)	212	815
Base of dam (approximate)	188	797
Crest of spillway	288	985
Top of crest gates	320	Ungated
Maximum flood-control pool	320	998
Maximum surcharge elevation (spillway design flood)	325	1,014
Maximum power pool	300	974
Usual minimum power pool	280	962
Occasional minimum power pool	268	920
Urban areas protected from floods	Roanoke Rapids, Weldon, Williamston, Jamesville, and Plymouth, N. C.	Bassett, Stanleytown, Koehler, Fieldale, and Martinsville, Va. and Spray, N. C.

Table No. 8 -- Reservoir data (contd.)

	Buggs Island Reservoir		Philpott Reservoir	
Reservoir (Figures in parentheses indicate elevation in feet of water surface above M.S.L.)				
Counties affected: In Virginia	Charlotte, Halifax, and Mecklenburg		Franklin, Henry, and Patrick	
In North Carolina	Granville, Vance, and Warren			
Length along (in miles): Roanoke River	39	(300) 56 (320)		
Dan River above junction	19	(300) 34 (320)		
Smith River			15 (974) 16 (985) 17 (998)	
Length of shoreline in miles		800 (300)		110 (985)
Maximum width in miles		2 (300)		0.75 (985)
Storage in acre-feet (flat pool assumption)				
Total volume	3,392,000	(325)	321,900	(1014)
Controlled flood storage	1,345,000	(320-300)	34,100	(985-974)
Power draw-down	1,085,000	(300-268)	111,100	(974-920)
Volume at minimum power pool	491,000	(268)	56,300	(920)
Surface area in acres (flat pool assumption)				
Maximum flood control pool	87,900	(320)	4,060	(998)
Maximum power pool	51,200	(300)	2,880	(974)
Minimum power pool	20,300	(268)	1,350	(920)
Original river area below elevation shown	4,280	(320)	310	(998)
Estimated costs (based on price levels prevailing in May 1948)				
Construction		$53,240,000		$11,360,000
Relocations necessary in reservoir		18,390,000		270,000
Lands to be purchased		7,240,000		380,000
Total		$78,870,000		$12,010,000
Average annual cost (based on price levels prevailing in May 1948)		$3,811,000		$604,000
Average annual benefits (based on price levels prevailing in May 1948)				
Flood control		$ 735,000		$264,000
Power		3,802,000		308,000
Other		132,000		86,000
Total		$4,669,000		$658,000
Economic ratio (charges to benefits)		1 to 1.23		1 to 1.09

NOTE: It is probable that the dollar values appearing in this table will fluctuate before completion of the projects.

c. Free public access be maintained, at selected locations, for types of use requiring no formalized facilities.

d. Areas be set aside, in the master plan, for individual or group cabin sites, to be occupied under permit.

The U. S. Fish and Wildlife Service report (prepared in the Boston Regional Office) indicates that the reservoir will result in a loss in wildlife resources ($27,000 annually) and a gain in fishery resources ($100,000 annually). Compensation for practically all of the loss of wildlife habitat may be derived by the construction of sub-impoundments where feasible.

The increase in the low-water flow below the dam will be of material benefit in the abatement of pollution. In their study of the reservoir, Sanitary Engineers of the U. S. Public Health Service determined that the reservoir will improve the quality of the water supply for Clarksville after the necessary adjustments to water and sewage systems have been made. The present water supply of South Boston should not be impaired by the reservoir since the present disectional flow of water past the water supply intake will be maintained.

In the operation of the reservoir suitable and specific measures will be taken to insure effective malaria control.

Table No. 9 indicates the effect of the reservoir on urban localities in the area.

Table No. 9 -- Urban areas affected by reservoir

Urban area	Population	Effect of reservoir
Clarksville, Va.	826	A number of small residential and commercial buildings to be acquired. High School to be protected or relocated. Water and sewer systems to be relocated.
South Boston, Va.	5,252	Certain property in the small community of Riverdale to be acquired. Backwater effect of Buggs Island reservoir is nullified by the reduction in flood stage afforded by Philpott reservoir.
Soudan, Va.	60	Entire village to be acquired.
Keats, Va.	51	Entire village to be acquired.
Buffalo Springs, Va.	75	Mineral springs in area to be protected or acquired.

Table [illegible] -- [illegible] are affected by [illegible]

[illegible]	[illegible]	[illegible]
[illegible] Va.	[illegible]	A number of small [illegible] and [illegible] [illegible] to be unlikely. [illegible] to [illegible] [illegible] to [illegible]. [illegible] to be polluted.
South Boston, Va.	[illegible]	[illegible] probably in the small [illegible] of Dan [illegible] [illegible] to be polluted. Residents [illegible] [illegible] should be [illegible] [illegible] by the [illegible] [illegible] [illegible].
Dundee, Va.	[illegible]	Public [illegible] [illegible] [illegible].
[illegible], Va.	[illegible]	Public [illegible] to be [illegible].
Buffalo Junction, Va.	[illegible]	Untreated [illegible] [illegible] to be produced on [illegible].

During a flood comparable to that of August 1940 the flood-control effect of the Buggs Island project would eliminate $4,882,000 in damages below the dam. Roanoke Rapids, Weldon, Williamston, Jamesville, and Plymouth would be protected from flooding. Damages on the 227,500 acres of land, including 49,000 acres under cultivation, which were flooded in 1940, would be negligible. Had the reservoir been in operation at the time of the flood the stage would have been 36.1 feet instead of 58.1 feet at Weldon, N. C. (zero of gage is 16.1 feet above mean sea level).

About 14 percent of the projected work has been completed. The completed work includes an access highway, an access railroad, and the field offices, service buildings, and quarters for housing supervisory personnel. The cofferdam to protect the first stage of construction has been built in the channel of the Roanoke River adjacent to the left bank. The work of excavating the foundation for the powerhouse and the first part of the dam was completed in April 1948. Another section of the cofferdam to protect the second stage of construction has just been completed (November 1948), thereby further exposing the river bed and permitting the laying of the foundation for another part of the dam.

The contract for the main structure was awarded to a group of three firms in April 1948. Included in this contract is the construction of the dam and powerhouse substructure. However, the government is obligated to supply the cement, the aggregate, and certain equipment. The manufacture of the aggregate and the supply of about 25 percent of the cement has already been contracted for. The equipment to be incorporated in the dam which is now being manufactured under government contract includes the sluice gates, the penstocks, and the intake gates, trashracks, and hoists.

The equipment to be incorporated in the powerhouse which is now being manufactured under government contract includes the main, intermediate, and station

[illegible] of August 1936 the flood-control effort

[illegible] $3,650,000 in damages below the dam.

[illegible] would be protected

[illegible] including 19,000 acres which

[illegible] would be negligible, and [illegible]

[illegible]

About [illegible] percent of the structural work had been completed. [illegible]

[illegible] in April 1940. [illegible]

[illegible] part of the dam.

[illegible]

The spillway is to be incorporated in the [illegible]

[illegible]

service turbines, the generators, the transformers, and the draft tube gates and appurtenances.

The acquisition of land within the limits of the lake to be created by the dam has proceeded for the past two years.

The construction of the dam and powerhouse, the manufacture of equipment to be installed in these structures, and the necessary reservoir activities will continue in accordance with a coordinated schedule for completion of the project. The next major phase in the construction of the dam is scheduled to begin in the spring of 1949 when concreting will start within the foundation now protected by the cofferdam. The manufacture of the large tainter gates to be installed on top of the concrete spillway will be contracted for early in 1949.

Other major items of work in the vicinity of the dam yet to be contracted for include the powerhouse and the earth dikes which abut the concrete dam. Reservoir activities, which must be completed before the dam is put in operation and water is permitted to be stored in the lake, include:

a. The alterations necessary to railroads, highways, and utilities,

b. The acquisition of the lands in the reservoir and the necessary adjustments to urban areas adjoining the proposed lake, and

c. The clearing of the woodland within the reservoir area.

If Congress provides the necessary funds and there is no undue interruption in the construction schedule, it is anticipated that the project will be completed by December 1952.

The appropriations for this project to date total $18,100,000 as follows:

1945	$ 300,000
1946	4,000,000
1947	4,800,000
1948	9,000,000
Total	$18,100,000

The operation of the reservoir will be under the supervision of the District Engineer, Norfolk, Va., and will be coordinated so as to meet the requirements for flood control, power, pollution abatement, malaria control, and low-water regulation. Electric power produced and not required for the operation of the project will be sold under the direction of the Secretary of the Interior.

COURTESY OF CORPS OF ENGINEERS

ARTIST'S SKETCH OF PHILPOTT PROJECT

PHILPOTT DAM AND RESERVOIR

The preparation of the definite project plans on Philpott Reservoir was authorized by the Chief of Engineers on 2 January 1946. In the preparation of the 1944 report engineering investigations included subsurface explorations and geological analyses of several dam sites as well as reconnaissances, designs, appraisals, and estimates similar to those for the Buggs Island Project. These were extended and made in more detail for the engineering requirements of the definite project plans. Six alternative schemes for developing the Philpott Project were considered prior to selecting the definite plan.

The site selected for the Philpott Dam is about 7 miles upstream from Bassett, Va. It may be reached by a road to the north from Highway 57 west of Bassett. Parking and observational facilities are available to the public.

The Federal Power Commission, the U. S. Public Health Service, in collaboration with the Virginia Department of Health, the National Park Service, the Virginia Geological Survey, and the U. S. Fish and Wildlife Service furnished valuable information concerning the project. A public hearing was held at Martinsville, Va., on 28 October 1938. The consensus of the 80 persons present was that flood control measures were needed. No subsequent hearings relative to improvements on Smith River have been held but letters received by the District Engineer since the project was authorized indicated a desire for its early construction.

The dam will be a concrete-gravity structure with a maximum height of 220 feet and a length of 920 feet. It will include a spillway section, a power intake monolith on the right flood plain adjacent to the spillway, and a nonoverflow section at each abutment. Additional information is listed in Table No. 8.

Within the reservoir there will be 154,500 acre-feet of space - the equivalent of 13.7 inches of run-off from the drainage area of 212 square miles -

for use in the control of floods below the dam. This will be made up of 34,100 acre-feet which may be retained between elevations 974 (maximum power pool) and 985 (crest of spillway), and 120,400 acre-feet which may be retarded, between elevations 985 and 1014 (two feet below the top of the nonoverflow sections of the dam), by the size of the spillway opening. The usable power storage will be 111,100 acre-feet between elevations 920 and 974. Below elevation 920 there will be dead storage capacity of 56,300 acre-feet. On the basis of annual silting rate of 50 acre-feet per 100 square miles of drainage area, which is deemed reasonable for the area, the dead storage capacity will not be filled with silt for over 500 years.

The Philpott project is located in Power Supply Area 10 which is served principally by the Appalachian Electric Power Company. It has been estimated that all of the dependable capacity provided by the installed power capacity of 14,000 kilowatts can be used in the load requirement of Area 10 within one or two years after construction.

Except for the fact that parts of Fairy Stone State Park will be contiguous to the reservoir area, the recreational aspects of the Philpott project are practically the same as those for Buggs Island. Similar recommendations were received from the National Park Service.

According to a report prepared by the Director of the U. S. Fish and Wildlife Service, losses in the present annual fishery value will result from flooding of streams by the reservoir. However, the potential value of the reservoir as a lake type of habitat and the enhancement of productivity below the dam from low-water regulation more than offset the losses of fishery values and produce an estimated net annual gain of $8,200. The inundation of wildlife and waterfowl habitats will cause an estimated net annual loss of $1,570. The U. S. Fish and Wildlife Service report shows an estimated net annual gain to fish and wildlife of $6,630.

The Smith and Dan Rivers below the Philpott site receive sewage from 6 principal municipalities (Bassett-Stanleytown, Fieldale, Martinsville, Leakesville-Spray (N. C.), Danville-Schoolfield, and South Boston) as well as industrial wastes. The approximate population equivalent of sewage and industrial wastes entering the Smith and Dan Rivers between the Philpott site and the upper end of Buggs Island Reservoir is 120,000 of which half is from industry. In computing the annual benefits from the Philpott project the sum of $20,000 was credited to pollution abatement. This was a conservative estimate.

Malaria control precautions, consistent with recommendations of Public Health Services, will be taken in the operation of the reservoir.

In investigating the reduction in flood damages due to the flood-control features of the Philpott project, the District Engineer studied the probability of the future recurrence of floods based on the floods which had occurred on Smith River between 1889 and 1945 as well as floods which had occurred on the adjacent river basins. Based on the state of development as it existed in 1940, and 1946 prices, he estimated the probable future average annual flood damages. These data were compiled for three sections of the river: Philpott to Fieldale; Fieldale to Leatherwood Creek; and Leatherwood Creek to the mouth of Smith River. For the recurrence of the most severe flood of record in the Smith River (July 1889) under the assumptions made, the effect of the Philpott project would be as follows:

	Without Philpott Project	With Philpott Project
Damage (in dollars)		
Philpott to Fieldale	1,094,000	0
Fieldale to Leatherwood Creek	698,000	0
Leatherwood Creek to mouth of Smith River	230,000	32,000
Stage (in feet)		
Bassett Gage (DA - 253 sq. mi.)	24	9.4
Martinsville Gage (DA - 374 sq. mi.)	25	15.0
Spray Gage (DA - 547 sq. mi.)	26	21.8

Small reductions in stage would also be realized along the Dan River.

The construction of an access highway was well under way in November 1948. The acquisition of lands within the limits of the reservoir area has been started and the excavation of the abutments has been practically completed.

With the available funds, it is intended to award a contract for the construction of the dam including the supply of the cement and aggregate therefor. Government contracts will also be awarded for the manufacture of the sluice gates, penstocks, and intake gates. The manufacture of the turbines to be installed in the powerhouse will also be contracted for.

The construction of the powerhouse, the alterations required in the reservoir area, and the cleaning of the woodland, within the limits of the proposed lake, will still have to be accomplished. If the Congress provides the necessary funds and there is no undue interruption in the construction schedule, it is anticipated that the project will be completed by the end of 1951.

The appropriations for this project to date total $2,700,000 as follows:

1946	$ 450,000
1947	250,000
1948	2,000,000
Total	$2,700,000

1896	$ [illegible]
1897	[illegible]
1898	[illegible]
	[illegible]

ROANOKE RAPIDS DAM AND RESERVOIR

The Virginia Electric and Power Company has recently applied for a Federal license to construct a hydroelectric plant on the Roanoke River, about one and one-half miles upstream from Roanoke Rapids, N. C. This is near the site selected in the Engineer study. The cost has been estimated at $19,000,000. This construction would form a reservoir covering nearly eight square miles and would utilize the Roanoke River to generate an average of 228,000,000 kilowatt-hours per year of additional electrical energy in the southern end of the Vepco system. Construction on the dam is expected to begin early in 1949 and to be completed by 1952. The contract has already been let subject to the license being granted by the Federal Power Commission. The proposed dam will be 2,840 feet long and the power station would include four hydraulic turbine generator units with a total capacity of 70,000 kilowatts. This exceeds the installed capacity contemplated in the 1944 Engineer report.

SCHOOLFIELD DAM AND RESERVOIR

In the 1944 Engineer report no storage for the control of floods was provided in the Schoolfield Reservoir. The top of the spillway was ungated and the storage space above the spillway crest would not reduce flood stages in the Dan River Valley.

In January 1948 the Senate Public Works Committee adopted a resolution calling for a review of the 1944 report (House Document No. 650, 78th Congress, 2nd Session) to determine the advisability of providing improvements for flood control at South Boston and vicinity. Public hearings were held at South Boston on 29 July 1948 and at Danville on 1 September 1948. Both hearings were well attended and those present, and the groups represented, were very desirous of securing relief from flood damages. The District Engineer is investigating the possibility of providing flood protection for the lower Dan River Valley, including South Boston, by adding to the proposed Schoolfield Reservoir space to be reserved for the storage of flood waters.

The possible development, as it is now considered, includes a dam with a lower spillway than contemplated in the 1944 report and the use of spillway gates. These gates would enable the storage of flood waters in the reservoir and a reduction in flood stages below the dam.

It is too early to make any predictions concerning the economic ratio which will be determined. All of the study is preliminary and subject to later changes. In Table No. 10 is a comparison of the data for a possible reservoir compared with similar data for the Schoolfield Reservoir as contemplated in the 1944 report.

Table No. 10 -- Data for Schoolfield Reservoir

	As in HD 650, 78th Cong., 2nd Session	As now under consideration(c)
Reservoir elevations, feet m.s.l.:		
Top of dam	527	530
Maximum (spillway design flood)	521	525
Top of gates	-	520
Spillway crest	500	489
Top of flood control reservation	-	520
Maximum power pool	500	500
Minimum power pool	487	487
Storage capacity, acre-feet:		
Surcharge storage (a)	282,000	82,000
Minimum flood storage reservation	0	251,000
To maximum power pool elevation	248,000	248,000
Usable power storage	100,000	100,000
Total storage (b)	248,000	499,000
Effect of proposed development on August 1940 flood:		
Natural flow in c.f.s.:		
At Danville	75,000	75,000
At South Boston	81,000	81,000
Flow after construction of Philpott Reservoir:		
At Danville	64,000	64,000
At South Boston	74,000	74,000
Flow after construction of Philpott and Schoolfield Reservoirs:		
At Danville	64,000	22,000 (d)
At South Boston	74,000	40,000 (d)

(a) Includes surcharge storage utilized above spillway crest or top of gates during spillway design flood with reservoir full prior to such a flood.

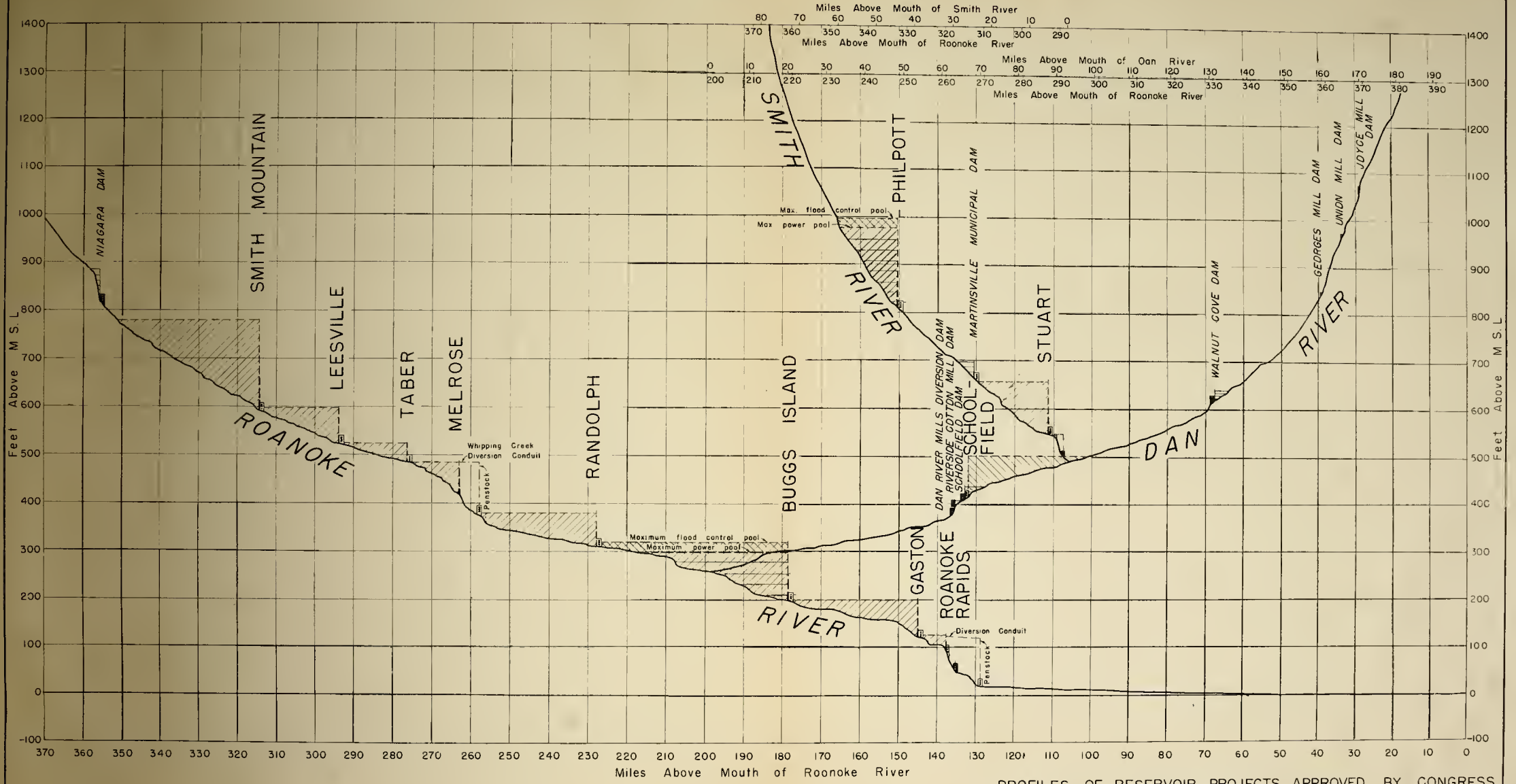
(b) To top of gates or to spillway crest of ungated dam.

(c) Preliminary, subject to change as the studies progress.

(d) No damage discharge at this locality.


VIRGINIA
NORTH CAROLINA
ROANOKE RIVER
SMITH RIVER BASIN
PHILPOTT DAM SITE
SMITH MT DAM SITE
LEESVILLE DAM SITE
TABER DAM SITE
MELROSE DAM SITE
WHIPPING CR DAM SITE
RANDOLPH DAM SITE
BUGGS ISLAND DAM SITE
GASTON DAM SITE
ROANOKE RAPIDS DAM SITE
SCHOOLFIELD DAM SITE
STUART DAM SITE
ALBEMARLE BASIN
CHESAPEAKE BAY
RICHMOND
PETERSBURG
LYNCHBURG
ROANOKE
DANVILLE
SUFFOLK
PORTSMOUTH
NEWPORT NEWS
HAMPTON ROADS
WINSTON-SALEM
GREENSBORO
HIGH POINT
RALEIGH
WILSON
GOLDSBORO
KINSTON
ASHEBORO
SALISBURY
LEGEND
Existing Reservoirs.
1 BALCONY FALLS DAM
2 CUSHAW DAM
3 BEDFORD DAM
4 BIG ISLAND DAM
5 COLEMAN FALLS DAM
6 HOLCOMB DAM
7 REUSEN DAM
8
9 HARVELL DAM
10 NIAGARA DAM
11 RIVERSIDE COTTON MILLS DAMS (2)
12 SCHOOLFIELD DAM
13 MARTINSVILLE DAM
14 JOYCES-MILLS DAM
15 LITTLE DAN RIVER DAM
16 SPRAY DAM
17
18 FAIRYSTONE LAKE DAM
19 PINNACLES DAMS (2)
20 BUSHER DAM
21 V.E.P. CO. DAM (ROANOKE RAPIDS DAM)
22 V.P.S. DAM
23 HALIFAX DAM
SMITH RIVER DRAINAGE BASIN LIMITS
ROANOKE RIVER DRAINAGE BASIN LIMITS
TWO RESERVOIRS APPROVED AND AUTHORIZED FOR CONSTRUCTION BY PUBLIC LAW 534, 78TH CONGRESS, 2ND SESSION
OTHER RESERVOIRS APPROVED BY PUBLIC LAW 534, 78TH CONGRESS, 2ND SESSION
ROANOKE RIVER BASIN
APPROVED RESERVOIR PROJECTS
IN 1 SHEET
GRAPHIC SCALE
10 0 10 20 30 40 MI
U S ENGINEER OFFICE NORFOLK VA
SEPTEMBER 1946
HEAD, DRAFTING SECTION
CHIEF, FLOOD CONTROL BRANCH
DISTRICT ENGINEER
DRAWN BY W.A.P.
CHECKED BY W.E.
TO ACCOMPANY DEFINITE PROJECT REPORT DATED 30 SEPTEMBER 1946
FILE NO GF 2008-0

PLATE 1



L E G E N D

TWO RESERVOIRS APPROVED AND AUTHORIZED FOR CONSTRUCTION BY PUBLIC LAW 534, 78TH CONGRESS, 2ND SESSION.

OTHER RESERVOIRS APPROVED BY PUBLIC LAW 534, 78TH CONGRESS, 2ND SESSION

EXISTING RESERVOIRS

PROPOSED POWER DEVELOPMENTS

EXISTING POWER DEVELOPMENTS

PROFILES OF RESERVOIR PROJECTS APPROVED BY CONGRESS FOR THE ULTIMATE DEVELOPMENT OF THE ROANOKE RIVER BASIN

SHEET 1

COMPREHENSIVE PLAN PREPARED BY

CORPS OF ENGINEERS

PLATE 2